CLAIMS

What is claimed is:

1. Apparatus to improve the filtering action of a quadrupole mass filter by reducing a precursor fault caused by an asymmetric electrical field between a pair of opposing electrode rods in a y-axis of the quadrupole mass filter, the apparatus comprising:
processing means for processing detector data to determine the filtering action of the quadrupole mass filter by checking for a precursor fault; and
power supply control means to introduce an AC potential difference across the electrode rods in the y-axis, if a precursor fault is detected, in order to reduce asymmetry in the electrical field in the y-axis.

2. Apparatus as claimed in claim 1, wherein the power supply control means comprises a potential divider to introduce an AC potential difference across the electrode rods in the y-axis

3. Apparatus as claimed in claim 2, wherein the power supply control means comprises means to manually control the potential divider.

4. Apparatus as claimed in claim 2, wherein the power supply control means comprises means to electronically control the potential divider.

5. Apparatus as claimed in claim 1, wherein the power supply control means comprises means to supply power separately to each electrode rod in the y-axis to introduce an AC potential difference across the electrode rods in the y-axis.

6. Apparatus as claimed in claim 5, wherein the power supply control means comprises means to manually control the means to supply power separately to each electrode rod in the y-axis.

7. Apparatus as claimed in claim 5, wherein the power supply control means comprises means to electronically control the means to supply power separately to each electrode rod in the y-axis.

8. Apparatus as claimed in claim 1, wherein the processing means comprises means to determine the cause of the precursor fault.

9. Apparatus as claimed in claim 1, wherein the processing means comprises means to determine the AC potential difference required to reduce asymmetry in the electrical field in the y-axis.

10. Apparatus as claimed in claim 9, when dependent on claim 8, wherein the processing means comprises means to determine the AC potential differences required to reduce asymmetry in the electrical field in the y-axis as the QMF scans across an ion mass-to-charge ratio scale when the precursor fault is due to mechanical misalignment or both mechanical misalignment and surface charge imbalance between the y-axis electrode rods.

11. Apparatus as claimed in claim 9, when dependent on claim 8, wherein the processing means comprises means to determine the AC potential difference required to reduce asymmetry in the electrical field in the y-axis as the QMF scans across an ion mass-to-charge ratio scale when the precursor fault is due to a surface charge imbalance between the y-axis electrode rods.

12. Apparatus, as claimed in claim 1, wherein the power supply control means comprise means to determine the AC potential difference required to reduce asymmetry in the electrical field in the y-axis.

13. Apparatus, as claimed in claim 12, wherein the power supply control means comprises means to determine the AC potential differences required to reduce asymmetry in the electrical field in the y-axis as the QMF scans across an ion mass-to-charge ratio scale when the precursor fault is due to mechanical

misalignment or both mechanical misalignment and surface charge imbalance between the y-axis electrode rods.

14. Apparatus as claimed in claim 12, when dependent on claim 8, wherein the power supply control means comprises means to determine the AC potential difference required to reduce asymmetry in the electrical field in the y-axis as the QMF scans across an ion mass-to-charge ratio scale when the precursor fault is due to a surface charge imbalance between the y-axis electrode rods.

15. Apparatus as claimed in claim 1, wherein the power supply control means comprises means to introduce an AC potential difference across the electrode rods in the y-axis to reduce asymmetry in the electrical field in the y-axis whenever the QMF is in operation.

16. Apparatus as claimed in claim 2, wherein the power supply control means additionally comprises means to introduce a DC potential difference across the electrode rods in the y-axis.

17. Apparatus as claimed in claim 16, wherein the means to introduce a DC potential difference comprises means to supply power separately to each electrode rod in the y-axis.

18. Apparatus as claimed in claim 16, wherein the means to introduce a DC potential difference comprises a potential divider.

19. Apparatus as claimed in claim 16, wherein the means to supply power separately are adapted to introduce a DC potential difference across the electrode rods in the y-axis.

20. Apparatus as claimed in claim 5, wherein the power supply control means comprises means to supply power separately to each electrode rod in a pair of opposing electrode rods in an x-axis.

21. A method of improving the filtering action of a quadrupole mass filter by reducing a precursor fault caused by an asymmetric electric field between a pair of opposing electrode in a y-axis, comprising the steps of:

determining the filtering action of the quadrupole mass filter by checking for a precursor fault; and

if a precursor fault is detected, introducing an AC potential difference across the electrode rods in the y-axis in order to reduce asymmetry in the electrical field.

22. A method as claimed in claim 21, further comprising the step of introducing an AC potential difference by changing the applied AC voltage at one electrode rod in the y-axis.

23. A method as claimed in claim 21, further comprising the step of introducing an AC potential difference by changing the applied AC voltage at both electrode rods in the y-axis.

24. A method as claimed in claim 22, further comprising the step of determining the cause of the precursor fault.

25. A method as claimed in claim 22, further comprising the step of determining the AC potential difference required to correct asymmetry in the electrical field in the y-axis.

26. A method as claimed in claim 22, further comprising the step of introducing an AC potential difference across the electrode rods in the y-axis whenever the QMF is in operation.

27. A method as claimed in claim 22, further comprising the step of introducing a DC potential difference across the electrode rods in the y-axis.

28. A method as claimed in claim 22, further comprising the step of supplying power separately to each electrode rod in a pair of opposing electrode rods in an x-axis.